sion (78%), diabetes (47%), hyperlipidemia (50%), coronary artery disease (25%), congestive heart failure (12%), chronic obstructive pulmonary disease (8%), hemodialysis dependence (15%) and active tobacco use (27%). Use of several medications increased after bypass: aspirin (51% to 66%), statins (53% to 62%), beta blockers (37% to 50%). Clopidogrel use was unchanged after bypass (33%). Mean follow up was 342 days (range 3-1591 days). At two-years, cumulative graft patency was 67%, limb salvage was 67%, and survival was 81%. Aspirin usage increased secondary graft patency from 46% to 83% ($P = .005$) and 51% to 73% ($P < .05$), respectively. Usage of clopidogrel or beta-blocker did not have a statistically significant effect on patency. Statin usage increased secondary graft patency from 59% to 73% ($P < .03$).

Conclusion: Medications commonly prescribed for atherosclerosis such as aspirin and statins demonstrated patency benefit in patients undergoing infrainguinal bypass in a population with predominantly critical limb ischemia.

Nonlinear Mechanical Behavior of the Common, External, and Internal Carotid Arteries In Vivo

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Introduction: The mechanical environment and properties of the carotid artery play an important role in the formation and progression of atherosclerosis in the carotid bifurcation. The purpose of this work was to measure and compare the range and variation of circumferential stress and tangent elastic moduli in the human common (CCA), external (ECA) and internal (ICA) carotid arteries over the cardiac cycle in vivo.

Methods: Measurements were performed in the surgically exposed proximal cervical CCA, distal ECA and distal ICA of normotensive patients (n = 16) undergoing carotid endarterectomy. All measurements were completed over the cardiac cycle in the repaired bifurcation. B-mode Duplex ultrasonography and semi-automatic segmentation algorithm were used to track changes in the arterial diameter and wall thickness in response to pressure measured concurrently with an angiocatheter placed in the CCA. These measurements were then used to calculate the variation of circumferential stresses, tangent elastic moduli, and dynamic stiffness of the arterial wall.

Results: The diameter and wall thickness of CCA, ECA and ICA were found to decrease and dynamic stiffness to increase from proximal CCA to distal ECA and ICA. The circumferential stress from end-diastole to peak-systole varied nonlinearly from 25±7 to 63 ± 23 kPa (CCA), from 22 ± 7 to 57 ± 19 kPa (ECA) and from 28 ± 8 to 67 ± 23 kPa (ICA). Tangent elastic moduli also varied nonlinearly as follows: from 0.40 ± 0.25 to 1.50 ± 2.05 MPa (CCA), from 0.49±0.34 to 1.14 ± 0.52 MPa (ECA) and from 0.68 ± 0.31 to 1.51 ± 0.69 MPa (ICA). The dynamic stiffness of CCA and ECA increased more than 3-fold and the dynamic stiffness of ICA increased more than 2.5-fold at peak-systole compared to end-diastole.

Conclusions: The in vivo mechanical behavior of CCA, ECA and ICA was qualitatively similar, but quantitatively different. All three arteries exhibited nonlinear variations of circumferential stress and tangent elastic moduli within the normal pressure range. The variability in the properties of CCA, ECA and ICA indicates a need for development of carotid models that match the in vivo properties of the carotid segments. The observed nonlinear behavior points to the need for future vascular mechanical studies to evaluate the mechanical factors of the arterial wall over the entire cardiac cycle.

Connecting the True Lumen: A Multicenter Experience Evaluating Chronic Total Occlusion Crossing With the Wildcat Catheter (the Connect Study)

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Objectives: Percutaneous techniques for crossing femoropopliteal chronic total occlusions (CTOs) offer an alternative to bypass surgery in patients deemed to be at increased risk due to advanced age or comorbidities. Current research demonstrates increasing success rates in catheters designed to reconstitute peripherally occluded arteries following failed guidewire passage. The Wildcat CTO catheter is a novel device with a rotating distal tip and deployable wedges fashioned for channeling a passage through arterial occlusions. (Fig). This combination is designed to improve overall operator device control and create a more reliable true lumen passage for therapeutic endpoints.

Methods: This study is a prospective, multicenter, non-randomized trial. Enrolled patients demonstrated a CTO of the femoropopliteal arteries and were not able to be successfully crossed with initial guidewire techniques. The primary measured efficacy endpoint is guidewire placement into the true distal lumen after Wildcat passage, as confirmed by angiography. Secondary safety and efficacy endpoints were assessed within a 30-day timeframe. Procedural site reporting was independently ratified by board-certified angiographic reviewers.

Fig.

Results: A total of 88 patients were enrolled with an average CTO length of 174 ± 96mm, 89% (n = 78) of which were de novo lesions. Approximately 55% (n = 48) of all lesions were categorized as containing at least moderate calcification. Greater than 85% (n = 75) of vessels were superficial femoral arteries. The device was used in 84 of 88 patients. Successful CTO crossing was reported in 89.3% (75/84) of cases with 4.8% (4/84) major adverse events or clinically relevant complications (Table 1).

Conclusions: In this multicenter study, the Wildcat CTO Catheter demonstrated an 89.3% (n=75) crossing rate with little associated morbidity (n = 0). Results surpassed the study design endpoints.

Answers to questions:

1. This new technology addresses a new method of crossing challenging femoropopliteal CTOs.
2. This can potentially improve interventional outcomes and procedural patency

Table. Primary safety and efficacy

Overall efficacy	89.3% (75/84)
Overall safety	95.2% (80/84)
Major adverse event	0.0% (0/84)
1. Death	
2. Unplanned major amputation	
3. Emergent target vessel revascularization	
Clinically significant perforation	4.8% (4/84)
Clinically significant embolization	0.0% (0/84)
Grade C dissection	0.0% (0/84)

Results of Iliac Stenting for Iliac Artery Occlusions

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Objective: The aim of this study was to evaluate the results of iliac stenting for iliac artery occlusions.

Methods: A retrospective review of 105 consecutive patients with iliac artery occlusions treated by percutaneous iliac stenting from 1998 to 2010 was completed from two teaching hospitals. Demographic and risk factor data was compiled. Primary and secondary patency was determined by Kaplan-Meier analysis.

Results: One hundred and five patients underwent attempted angioplasty/stenting of an iliac artery occlusion. 96 iliac artery occlusions were successfully treated (technical success 91%). Indications for the procedure were life style-altering claudication in 68 patients (70%), ischemic rest pain 16 (17%) and ischemic ulcer/toe gangrene 12 (13%). Iliac stenting was performed for 50 common iliac artery occlusions (TASC B), 36 external iliac artery occlusions (TASC C) and 10 combined common and external iliac artery occlusions (TASC D). Four patients underwent simultaneous femoral artery endarterectomy. Contralateral iliac stenosis was present in 52 patients and twenty-seven had infrainguinal arterial occlusive disease. Unilateral femoral access 50, bilateral femoral 35, brachial artery 2 and combined brachial and femoral access was used in 9 patients. Thrombolysis with TPA was performed prior to iliac stenting (n3). Technical aids for crossing the

lesion were used in thirteen patients (14%). Major complication rate was 4%, with a 30-day mortality rate of 0%. Iliac artery rupture in 2 (operative repair 1, prolonged balloon inflation 1), rupture of infected iliac pseudoaneurysm 1 (operative repair) and distal embolization to tibioperoneal trunk 1 (TPA infusion). Access related complications (3%) included brachial artery occlusion 1, groin hematoma 1, and femoral artery thrombus in 1 patient.

One patient with critical limb ischemia had BKA secondary to infection at 6 month and another patient had AKA following repair of ruptured iliac pseudoaneurysm at three month follow up.

Conclusion: Our results demonstrate that iliac stenting for common and external iliac occlusions can be performed safely and effectively with acceptable primary patency and excellent secondary patency. Definitive recommendations for combined common and external iliac artery occlusions will require larger case series.

Table I. Primary and secondary patency of iliac stenting for iliac occlusions.

	Common iliac artery occlusions (n = 50)	*External iliac artery occlusions (n = 36)*	*Combined common and external iliac artery occlusions (n = 10)*
Primary patency (54 months)	78%	72%	75%
Secondary patency (54 months)	94%	88%	90%

Table II. Patients' demography and risk factors in 96 successfully treated patients

Variable	*Number (%)*
Men	51 (53%)
Diabetes mellitus	26 (27%)
Hyperlipidemia	55 (57%)
Coronary artery disease	53 (55%)
Hypertension	76 (79%)
Renal Failure (eGFR <50)	10 (10%)
Nicotine abuse	82 (85%)
Mean age	62 ± 12 years

Endovascular Recanalization of Total Occlusions of the Mesenteric Arteries

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Objective: Evaluate our experience with the endovascular treatment of total occlusions (TO) of the mesenteric and celiac arteries.

Patients and Methods: We treated 13 lesions in 12 patients with symptomatic TO of the mesenteric arteries (6 males, age 71 ± 10 yrs). The presentation was acute in two patients, acute on chronic in 5 and chronic in 4. The initial approach was transfemoral in 9 patients, and transbrachial in 4. The approach was converted to brachial after failure of the tranfemoral approach in 4 patients. Treated vessel was SMA in 11 and Celiac artery in 2. Mean occlusion length was 3.2 ± .8 cm. Heavy calcification of the main artery trunk were present in 10 lesions. Associated calcified aortic plaque was present in 8 occlusions. A stump (1 mm projection beyond the aortic lumen at he expected level of the occlusion was identified in 10 occlusions on CT and/or angiography.

Results: Technical success was achieved in 12 procedures (92%). The majority of occlusions could be crossed intraluminally. The single-most important prerequisite for recanalization of ostial TO was proper localization of the true stump, stable catheter tip position for subsequent negotiation of the stenosis which is function of access approach and catheter curve, and lastly the traversal route (intraluminal vs subintimal). Subintimal recanalization is less advised in severely diseased vessels. Complications included brachial artery thombosis/hematoma necessitating exploration and repair (3). Clinical improvement was noted in all patients. Delayed instent restenosis developed in three patients, including one who had subintimal recanalization of a long-occlusion who developed restenosis of the lumen distal to the stent due to a chronic dissection. Recurrences were treated with cutting balloon angioplasty or restenting.

Conclusion: Endovascular recanalization of mesenteric arterial occlusion is feasible and highly successful provided careful planing is used. CT and good quality fixed lateral fluoroscopy were crucial for the localization of the stump and to plan the level of probing on angiography during the recanalization procedure.

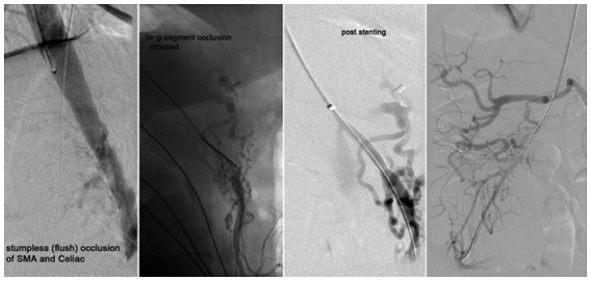

Fig.

Surgical Removal of Inferior Vena Cava Filters With Caval Perforation or Contra-Indication to Percutaneous Retrieval: Case Series

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Objectives: We recently had a patient with resolution of abdominal and back pain after open filter inferior vena cava (IVC) removal with strut perforation of the cava. We sought to identify patients with open IVC removal and evaluate indications for surgery, describe operative techniques, and review outcomes.

Methods: After IRB approval, we reviewed operative reports and hospital charts from 2005-2011, searching CPT codes for foreign body removal (37203) and reconstruction of vena cava (34502).

Results: Four cases of open removal of IVC filters were identified. All patients were female from 30-45 years old. Three had pain of unexplained etiology and filter struts penetrating the cava. Two had failed percutaneous retrieval. One had a tumor involving the IVC and suprarenal filter after pulmonary embolism. The indication for implantation of IVC filters were DVT with progression while on anticoagulation in three patients. The types of filters removed were 1 Greenfield, 2 Bard, and 1 Celect filter. Removal techniques included laparotomy: two cases had primary caval repair, one case involved a percutaneous approach after cutting away the struts, and one case (with sarcoma) had IVC resection and PTFE graft replacement. The length of stay was 9 ± 6 days, and there were no mortalities. All three symptomatic patients that presented with struts penetrating the cava had resolution of pain.

Conclusions: Patients with pain after IVC filter placement should be evaluated for strut perforation of the cava. If percutaneous removal is not possible, open removal can be accomplished with minimal morbidity and may resolve pain.

Aortoduodenal Fistula Following EVAR

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Objectives: We describe diagnosis and management of aortoduodenal fistula following EVAR.

Methods: Review of this case, as well as review basic principles regarding aortoduodenal fistulas.

Results: A 66 year old male with history of MI, ESRD, gastric neoplasm, perforated diverticulitis with Hartman's and ostomy reversal, and EVAR with Gore Excluder was evaluated for GI bleeding. Endoscopy was performed, showing a large, friable mass in the duodenum. A CT scan was performed and active bleeding was identified in the excluded sac as well as perigraft air. The patient was taken to the operating room and an axillary-bifemoral bypass graft was performed. Infrarenal aortic and iliac control was obtained. A fistula between the excluded aneurysm sac and the 3rd portion of the duodenum was identified and divided. The fistula was not in contact with any portion of the stentgraft. The stentgraft was removed, the aorta was oversewn, and the duodenum was repaired. A patent lumbar was ligated. Gastrostomy and jejunostomy tubes were placed and the abdomen closed. The patient was extubated on postoperative day #2. He experienced further GI bleeding from gastric ulcers, which resolved with PPIs. He was discharged to a physical rehabilitation facility. Final cultures revealed growth of enterococcus faecium from the stentgraft. The EGD biopsy showed no malignancy. Aortoenteric fistula after aortic replacement occurs in approximately 0.36% of cases; primary AEF is also rare, with less than 300 reported cases in the literature. This case appears to represent a primary AEF, as no portion of the stentgraft was in contact with the fistula. This patient's previous perforated diverticulitis was probably the source of aortic bacterial contamination. In a literature review, patients who fared best were hemodynamically stable and first underwent extraanatomic bypass grafting, followed by graft removal. In the unstable patient, the graft is excised and the lower extremities are examined. If the patient is stable, extraanatomic bypass may then be undertaken.